

FIG. 1
Prior Art

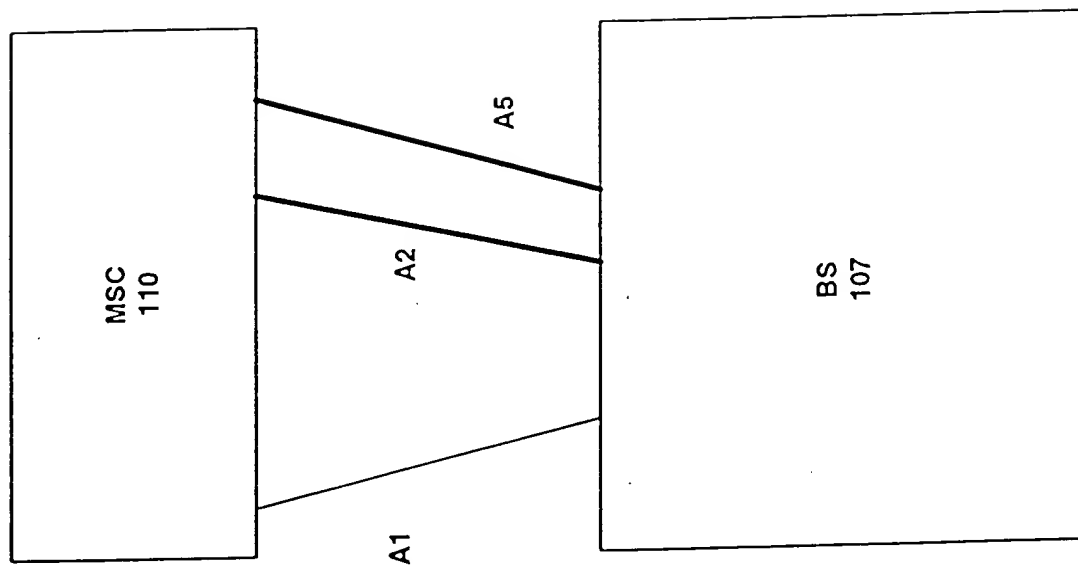
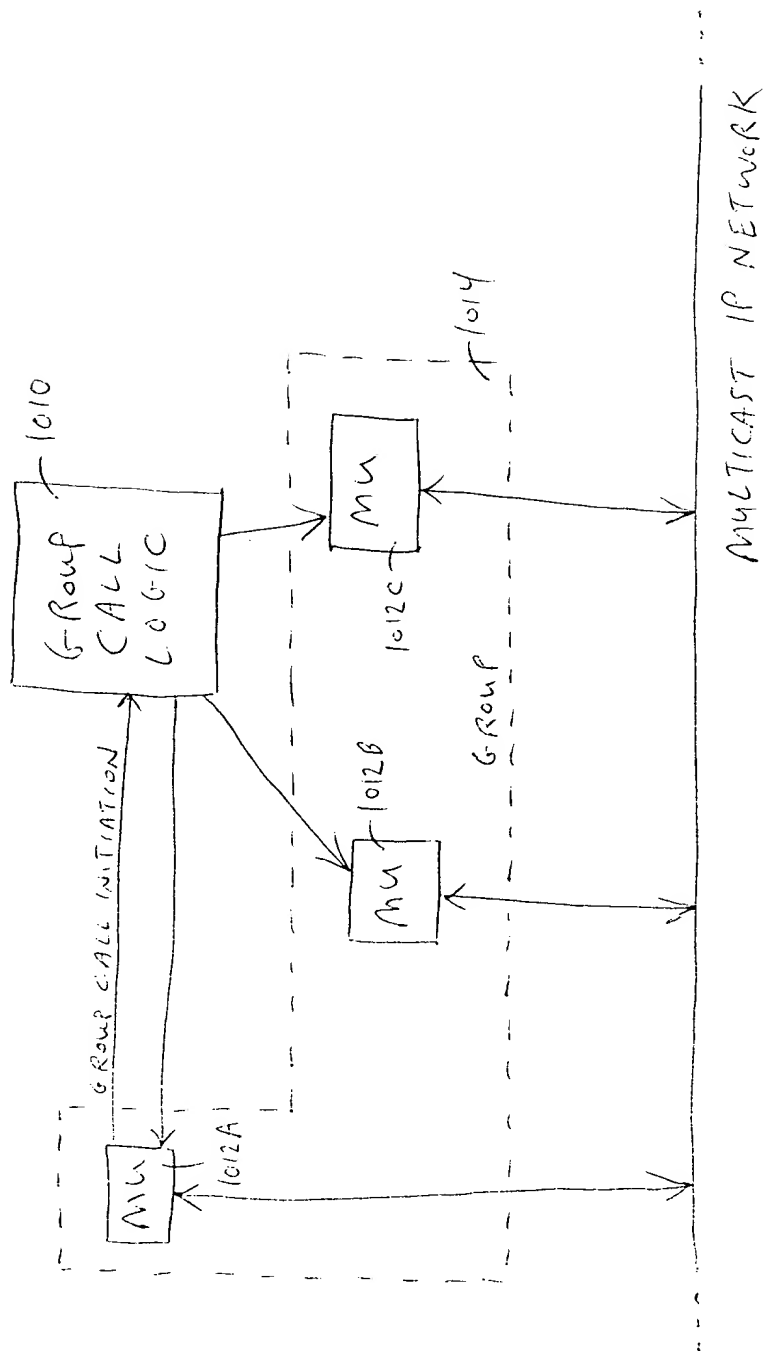


Fig. 2
Prior Art

[illegible]

F16.3

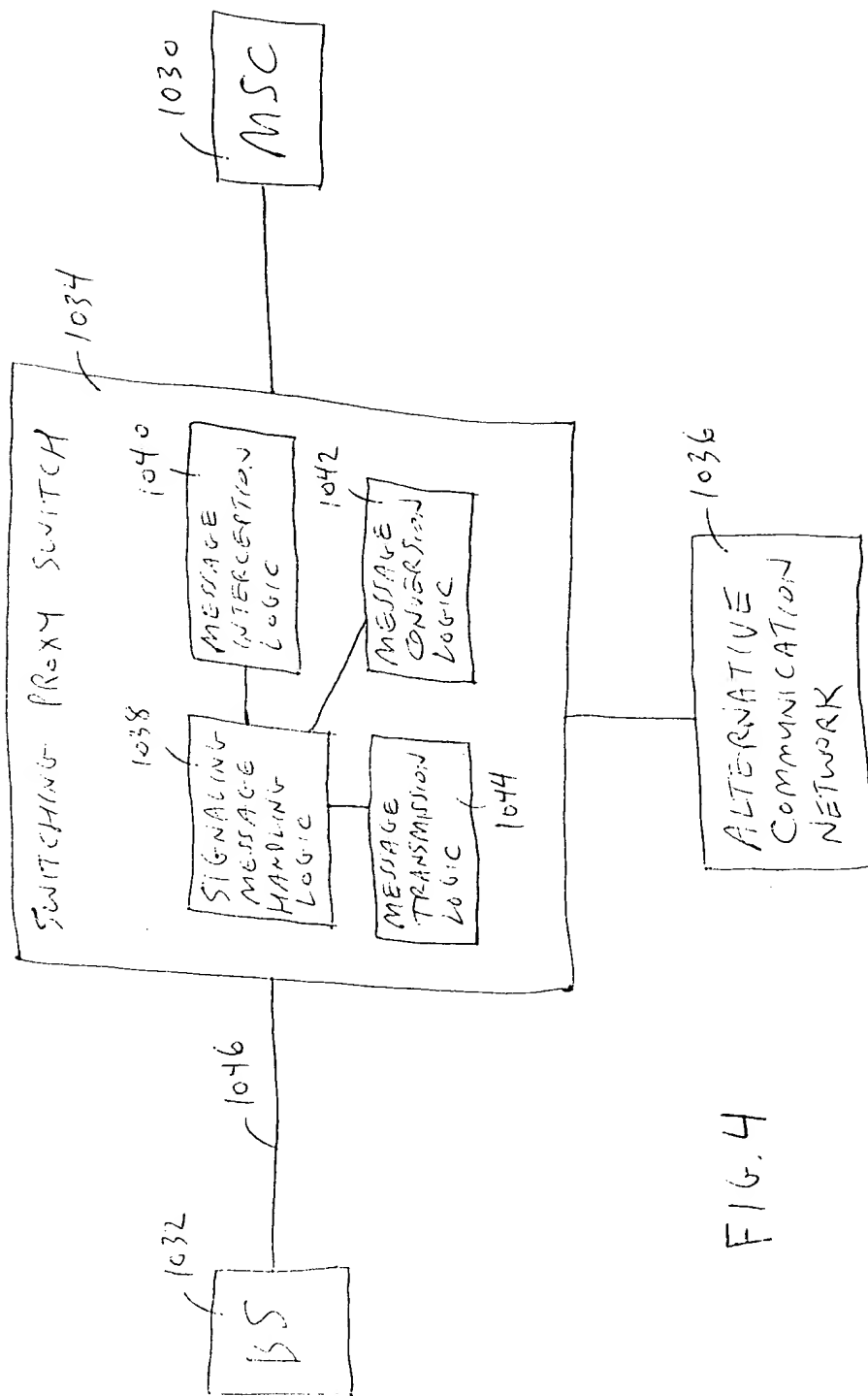


FIG. 4

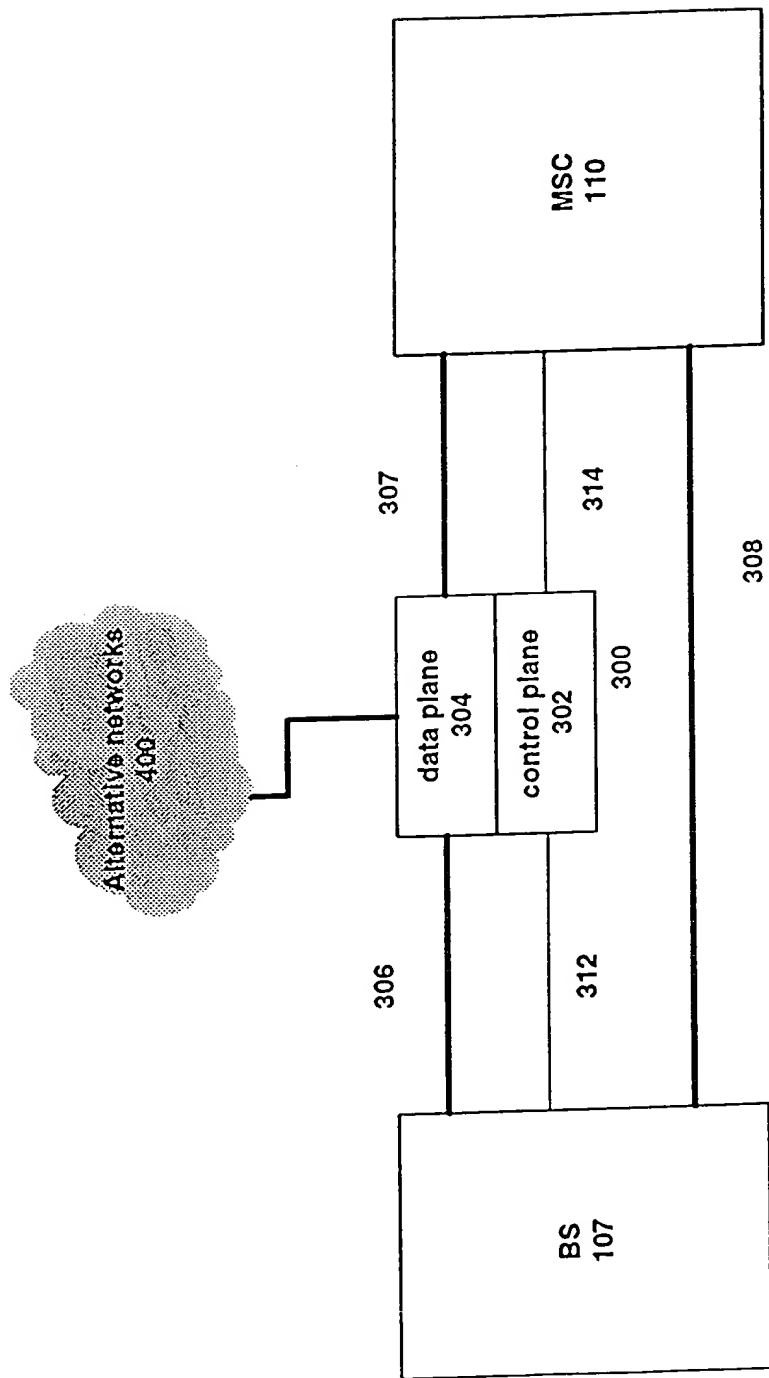


Fig. 5

FIG. 6

400

300

401

304

PPP Termination
410

PPP Relay
408

A5
406

VoIP
404

DACS
402

control plane
302

BS
107

MSC
110

308

306

312

314

307

PSTN
120

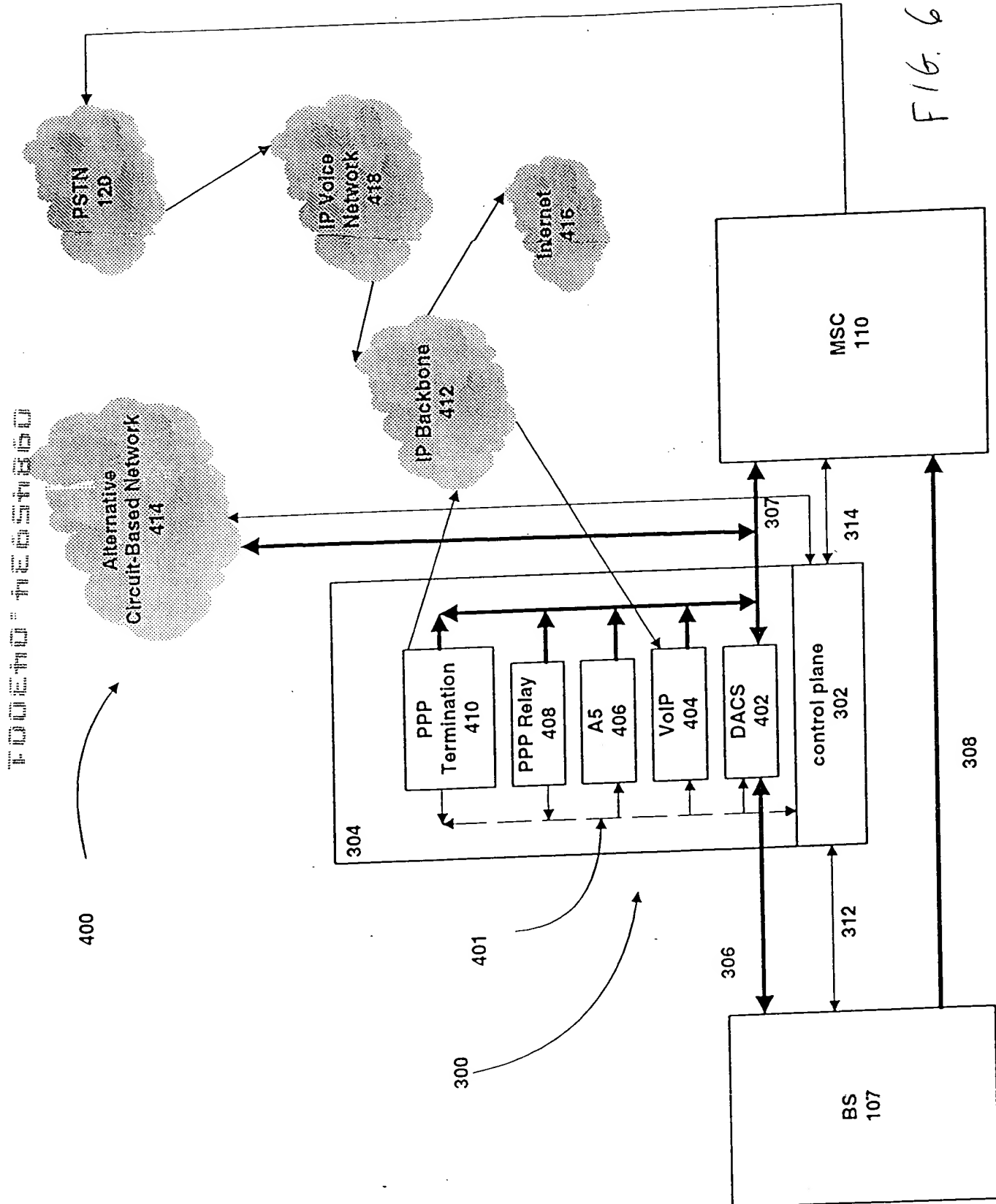
Alternative
Circuit-Based Network
414

IP Backbone
412

IP Voice
Network
418

Internet
416

FIG. 6



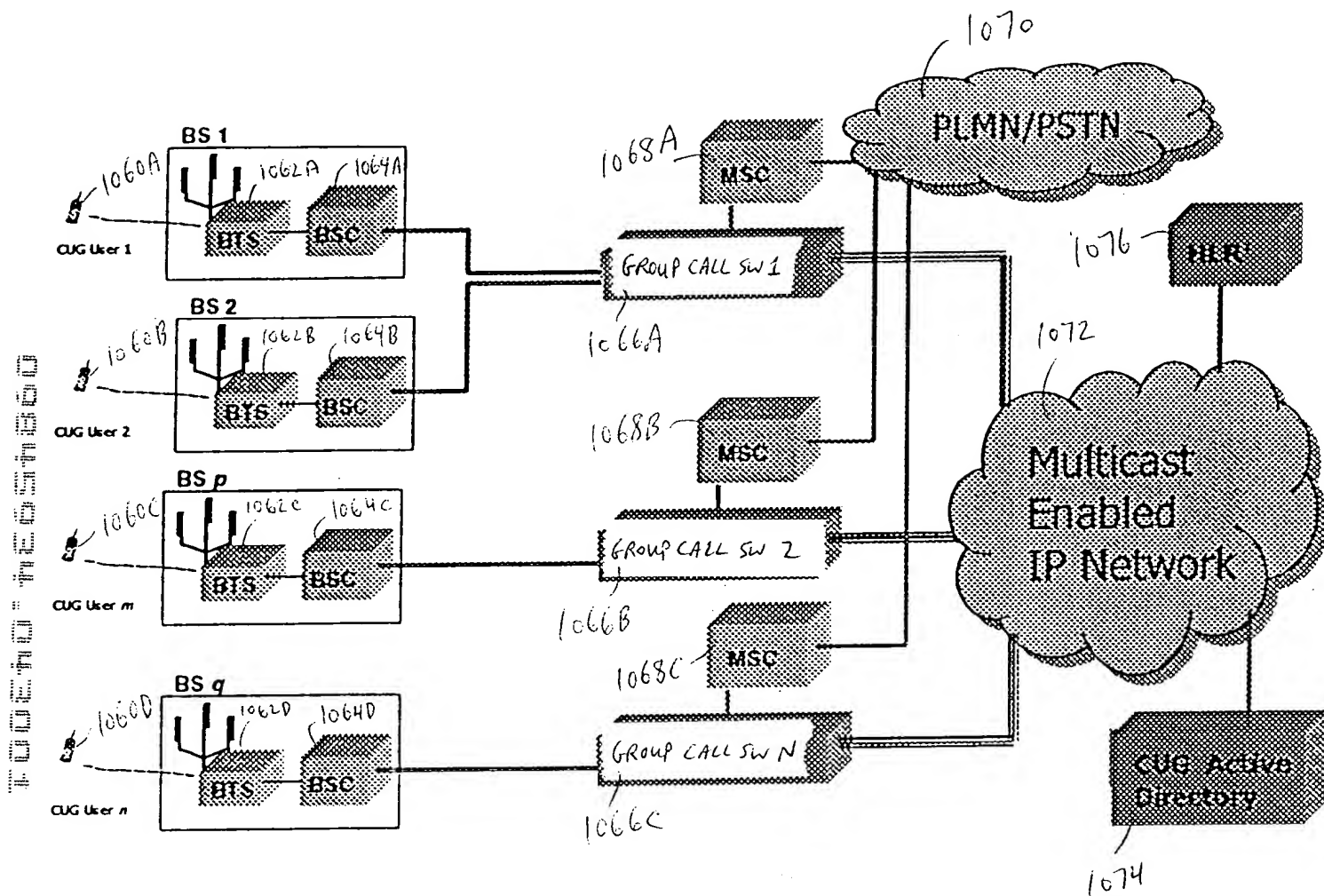


FIG. 7

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sequenceDiagram
    participant MS-A
    participant BSC-1
    participant WCS-1
    participant MG1
    participant MG2
    participant WCS-2
    participant BSC-2
    participant MS-B
    participant HLR
    participant GCR

    MS-A->>BSC-1: 1. Origination Message
    BSC-1->>WCS-1: 2A. CMSR Message
    WCS-1->>MG1: 3. CMSR Message
    MG1->>MG2: 
    MG2->>WCS-2: 4. Get GCR User info list
    WCS-2->>HLR: 5. Get GCR User info list response
    HLR->>GCR: 
    GCR->>HLR: 
    HLR->>WCS-2: 
    WCS-2->>MG2: 6. Create Connection
    MG2->>MG1: 7. Create Conn. ACK
    MG1->>WCS-1: 8. Create Connect
    WCS-1->>MG1: 9. Create Connect ACK
    MG1->>WCS-1: 10. Assignment Request
    WCS-1->>MG1: 11. Create Connect
    MG1->>WCS-1: 12. Create Connect ACK
    WCS-1->>BSC-1: 13. Assignment Request
    BSC-1->>MS-A: 14. Channel Assignment
    MS-A->>BSC-1: 15. TCH Preamble
    BSC-1->>WCS-1: 11B1. Paging Request
    WCS-1->>MG1: 11B2. Paging Request
    MG1->>MG2: 11B3. 
    MG2->>WCS-2: 11B4. Page Message
    WCS-2->>BSC-2: 11B5. Page Response
    BSC-2->>WCS-1: 11B6. Paging Response
    WCS-1->>MG1: 11B7. Paging Response
    MG1->>MG2: 11B8. Create Connection
    MG2->>WCS-2: 
    WCS-2->>BSC-2: 
    BSC-2->>MS-A: 17. MS ACK Order
    MS-A->>BSC-1: 18. Service Connect
    
```

The diagram illustrates the registration process for a Mobile Station (MS-A). The process begins with MS-A sending an Origination Message to BSC-1. BSC-1 then sends a CMSR Message to WCS-1, which forwards it to MG1. MG1 sends a message to MG2, which then sends a 'Get GCR User info list' request to WCS-2. WCS-2 sends a 'Get GCR User info list response' to HLR, which in turn sends a message to GCR. GCR sends a message back to HLR, which then sends a message to WCS-2. WCS-2 sends a 'Create Connection' message to MG2, which sends a 'Create Conn. ACK' to MG1. MG1 sends a 'Create Connect' message to WCS-1, which sends a 'Create Connect ACK' to MG1. MG1 then sends an 'Assignment Request' to WCS-1, which sends a 'Create Connect' message to MG1. MG1 sends a 'Create Connect ACK' to WCS-1. WCS-1 then sends an 'Assignment Request' to BSC-1. BSC-1 sends a 'Channel Assignment' message to MS-A. MS-A sends a 'TCH Preamble' to BSC-1. BSC-1 sends a 'Paging Request' to WCS-1, which sends a 'Paging Request' to MG1. MG1 sends a message to MG2. MG2 sends a 'Page Message' to WCS-2, which sends a 'Page Response' to BSC-2. BSC-2 sends a 'Paging Response' to WCS-1, which sends a 'Paging Response' to MG1. MG1 sends a 'Paging Response' to MG2. MG2 sends a 'Create Connection' message to WCS-2. WCS-2 sends a message to BSC-2. BSC-2 sends a 'MS ACK Order' message to MS-A. MS-A sends a 'Service Connect' message to BSC-1.

FIG. 8A

FIG. 8B

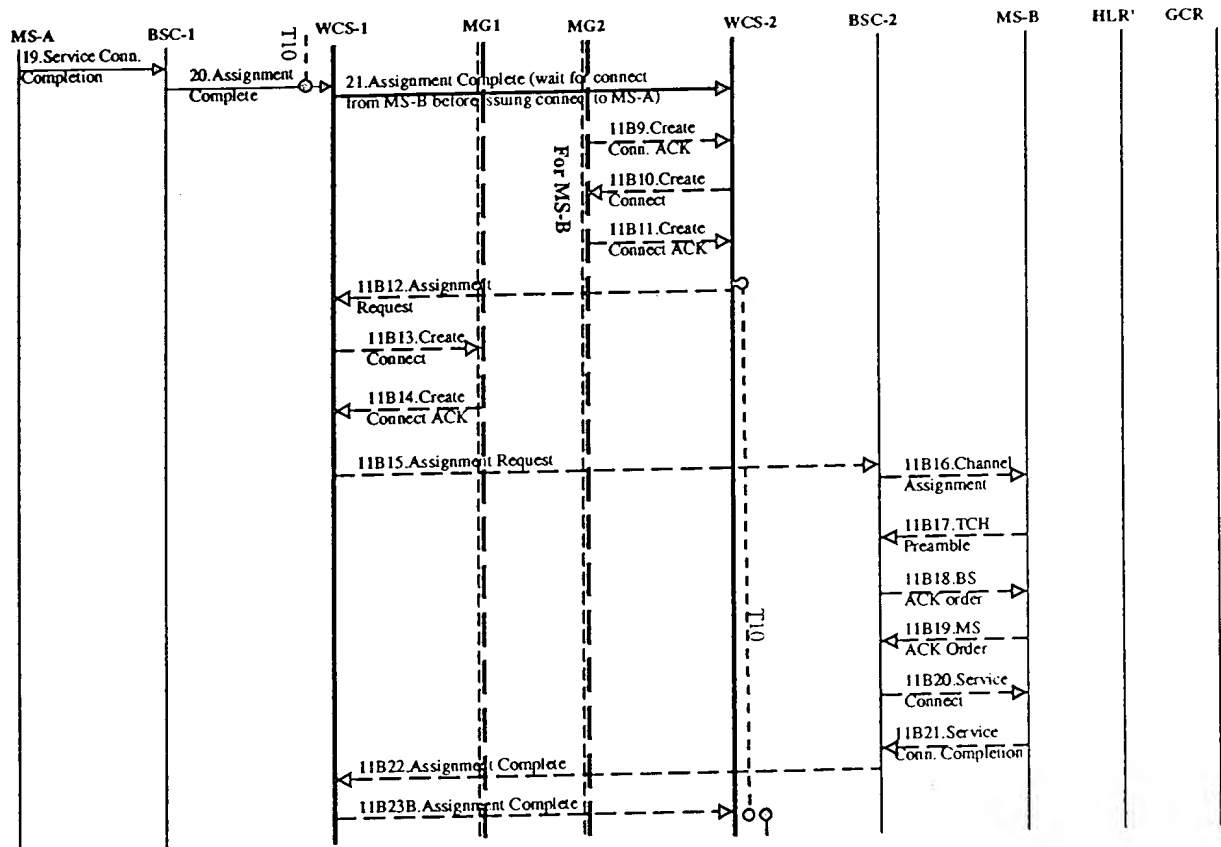


FIG. 8B

FIG. 8C

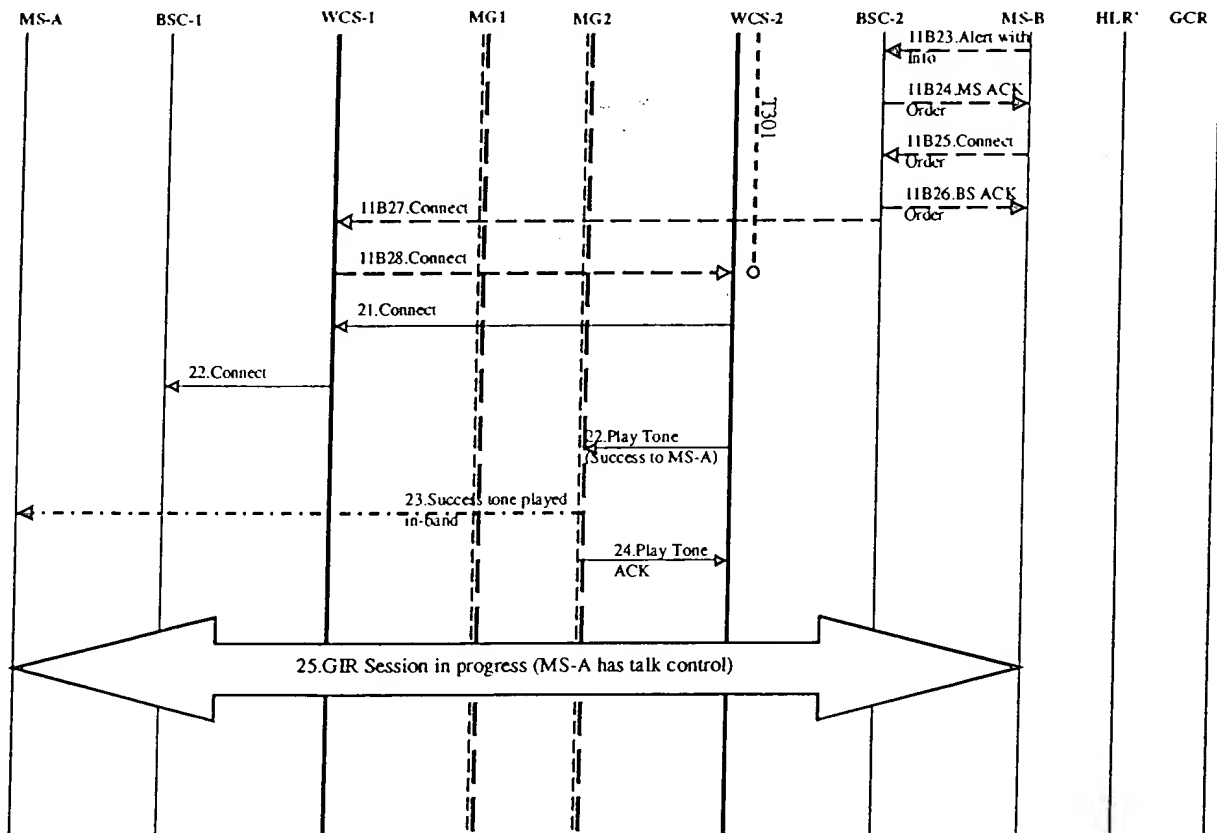


FIG. 8C

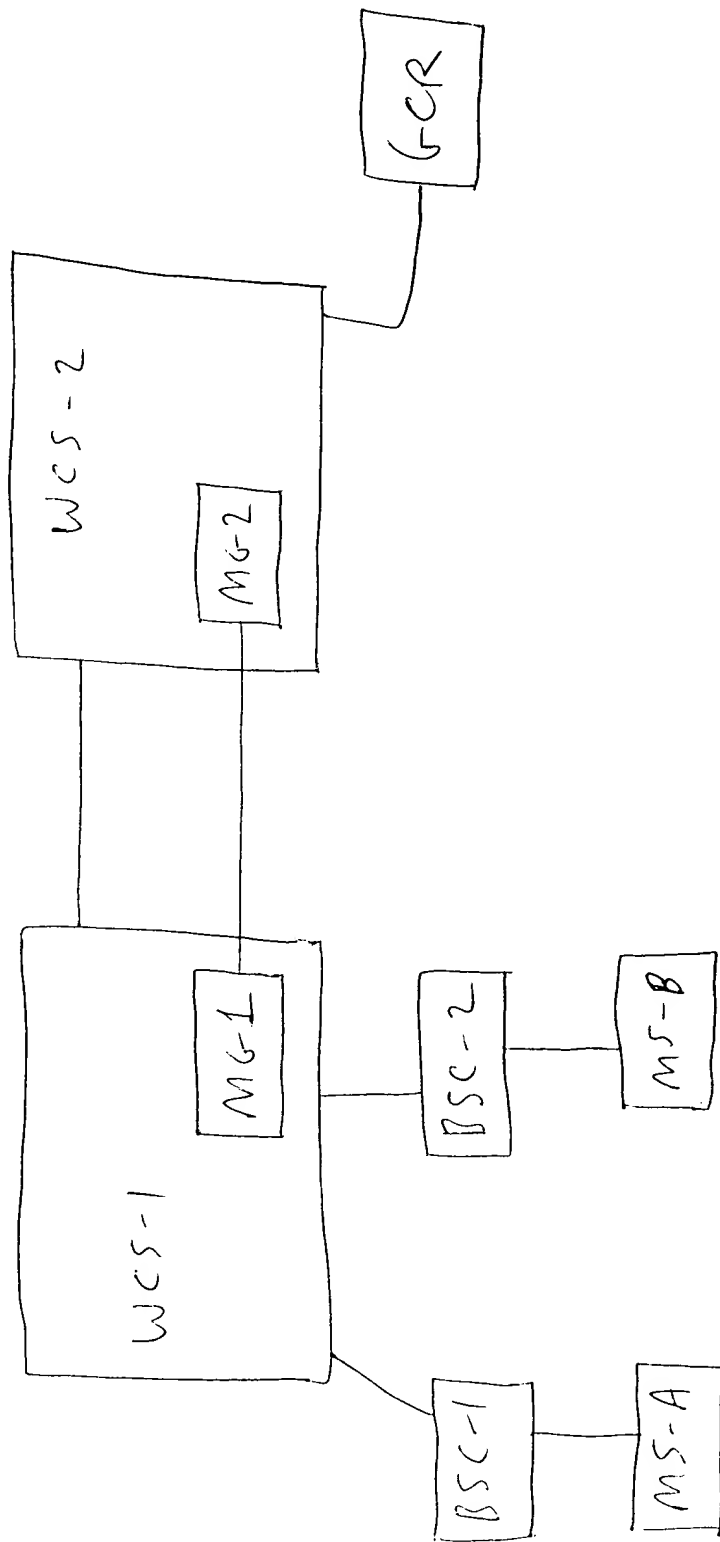


FIG. 9

WCS-1

WCS-2

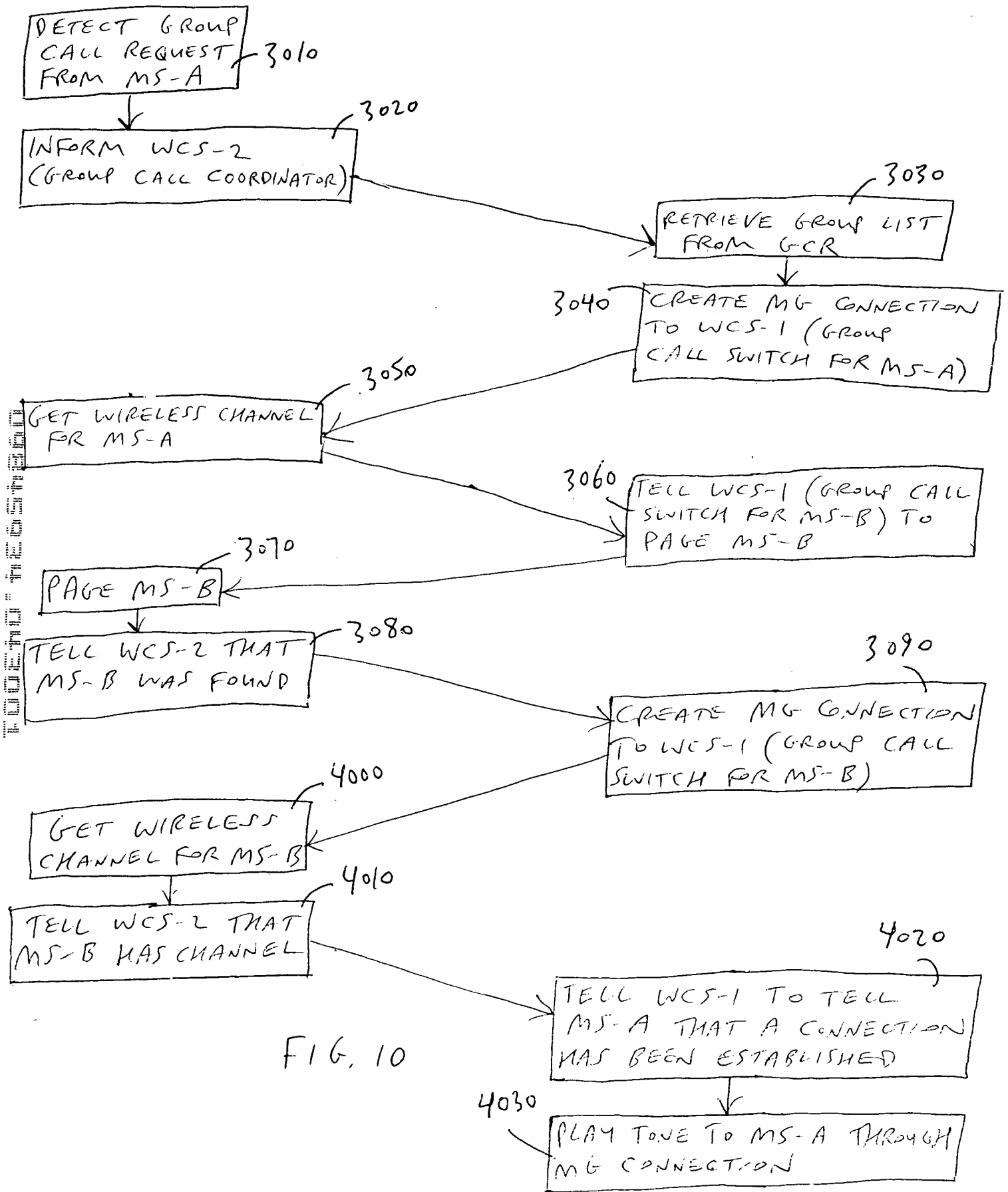


FIG. 10

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sequenceDiagram
    participant MS1 as MS-1
    participant BSC1 as BSC-1
    participant WCS1 as WCS-1
    participant MG1 as MG1
    participant MG2 as MG2
    participant WCS2 as WCS-2
    participant BSC2 as BSC-2
    participant MS2 as MS-2
    participant HLR as HLR
    participant GCR as GCR

    Note over MS1, BSC1, WCS1, MG1, MG2, WCS2, BSC2, MS2, HLR, GCR: 5. Talk control for GIR session now available to all participants in the call

    BSC2->>WCS2: 1. Start DTMF
    WCS2->>WCS1: 2. Start DTMF
    WCS1->>MG1: 3. Modify Connect
    MG1->>WCS1: 4. Modify Connect ACK
    WCS1->>MG2: 5. Play Tone
    MG2->>MS2: 6. Success tone played in-band
    MS2->>MG2: 7. Play Tone ACK

    Note over MS1, BSC1, WCS1, MG1, MG2, WCS2, BSC2, MS2, HLR, GCR: 8. GIR Session in progress (MS-2 has the talk control)
  
```

FIG. 11

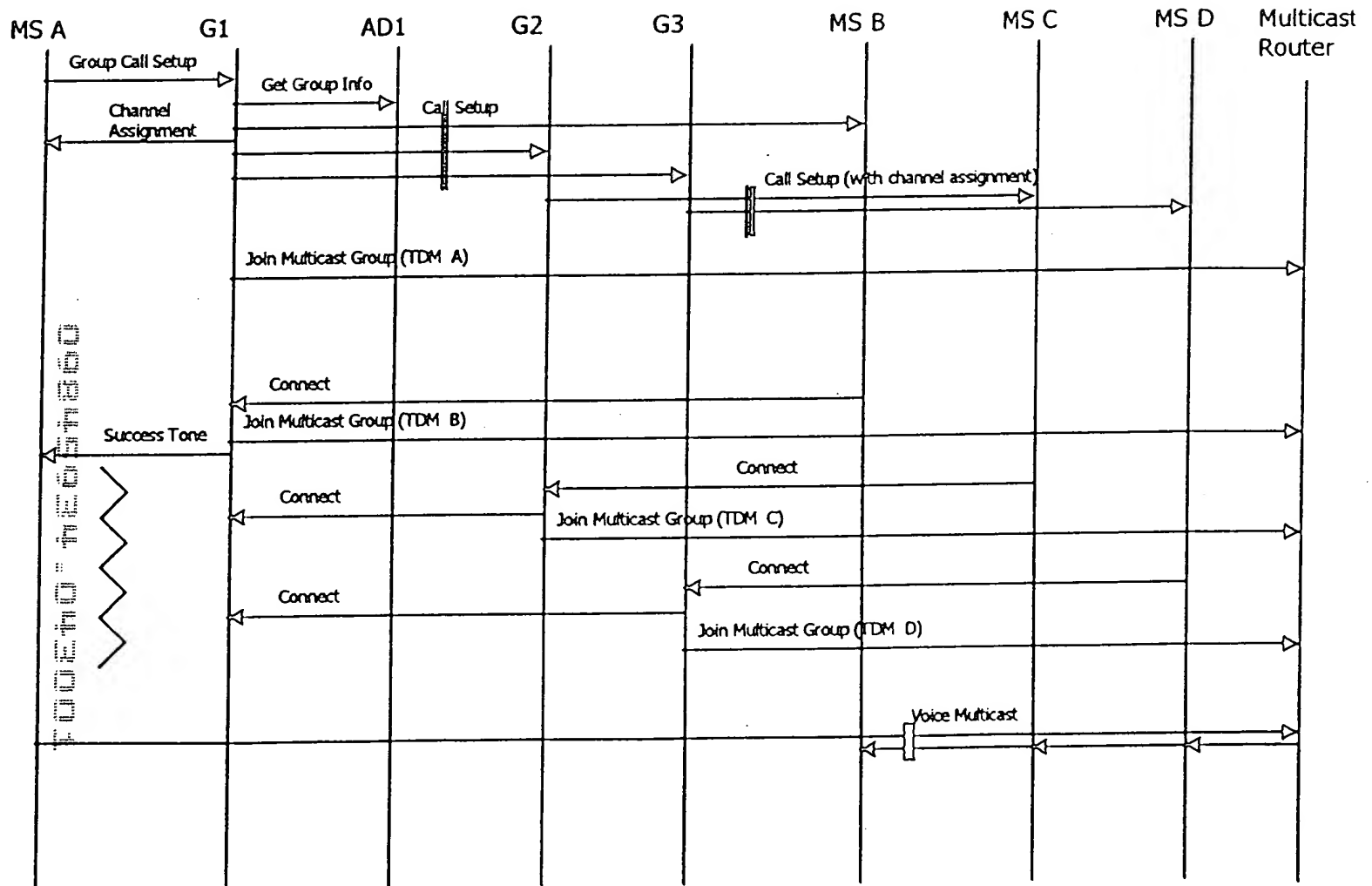


FIG. 12

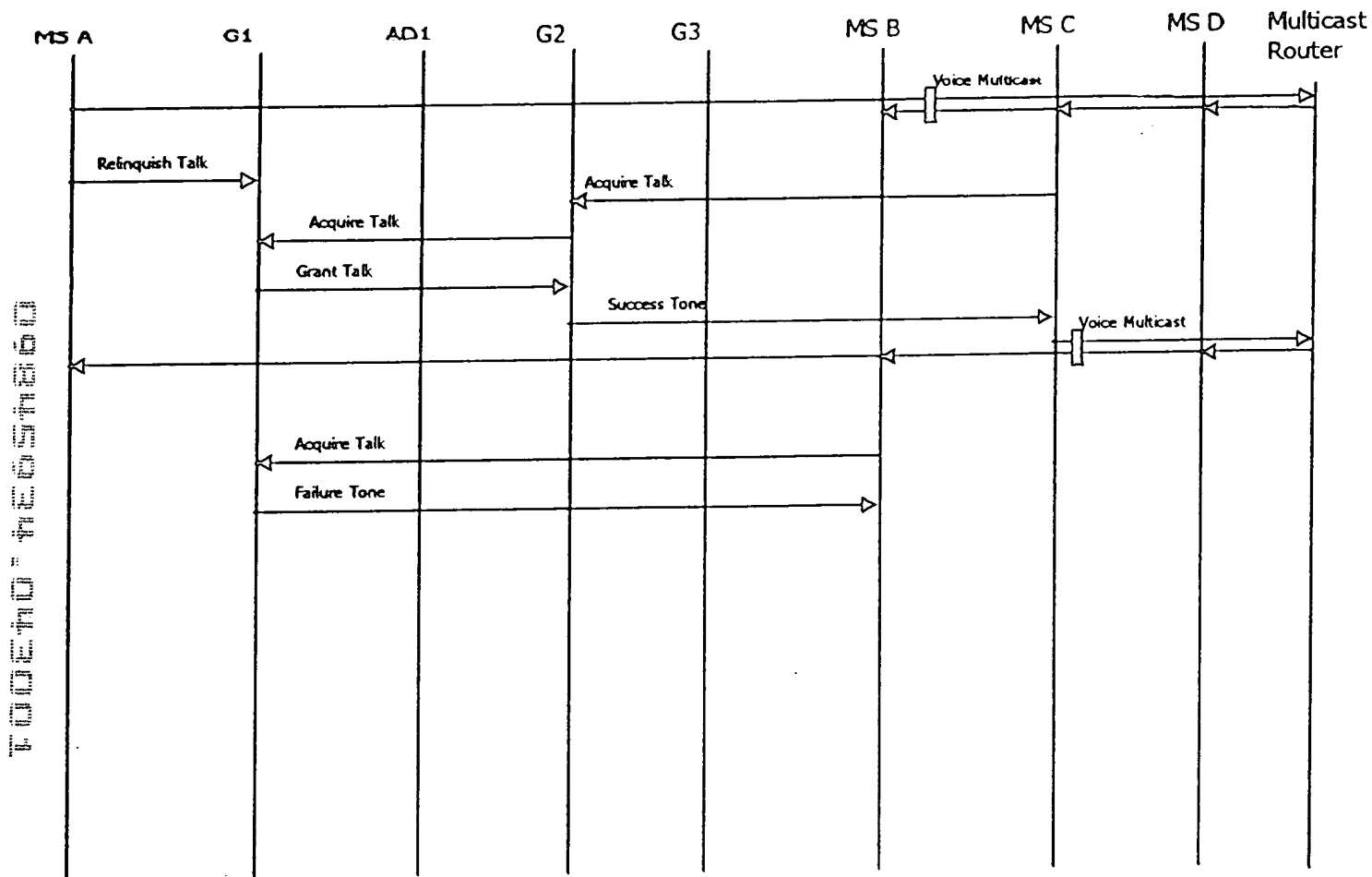


FIG. 13

FIG. 14

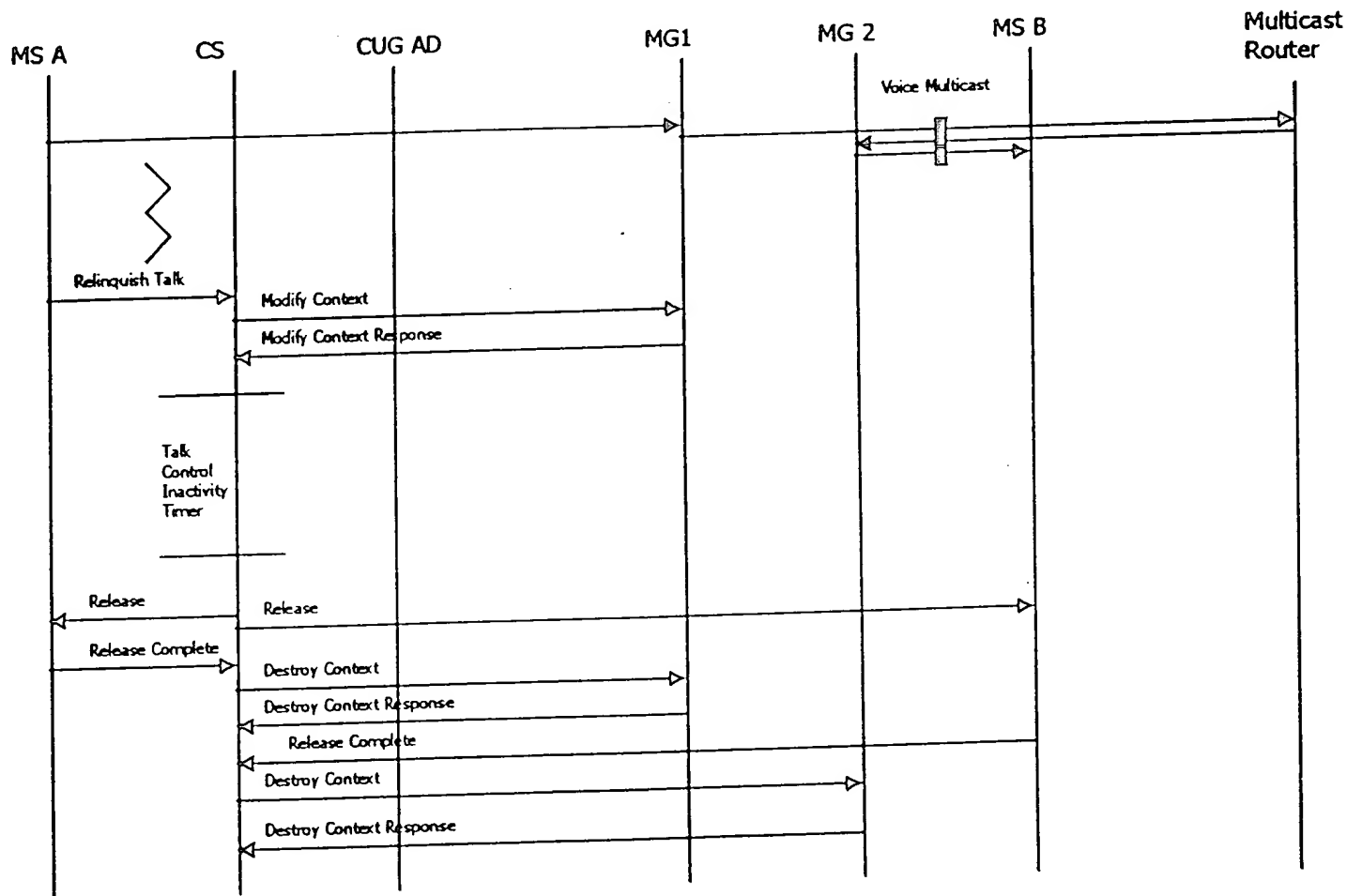


FIG. 14

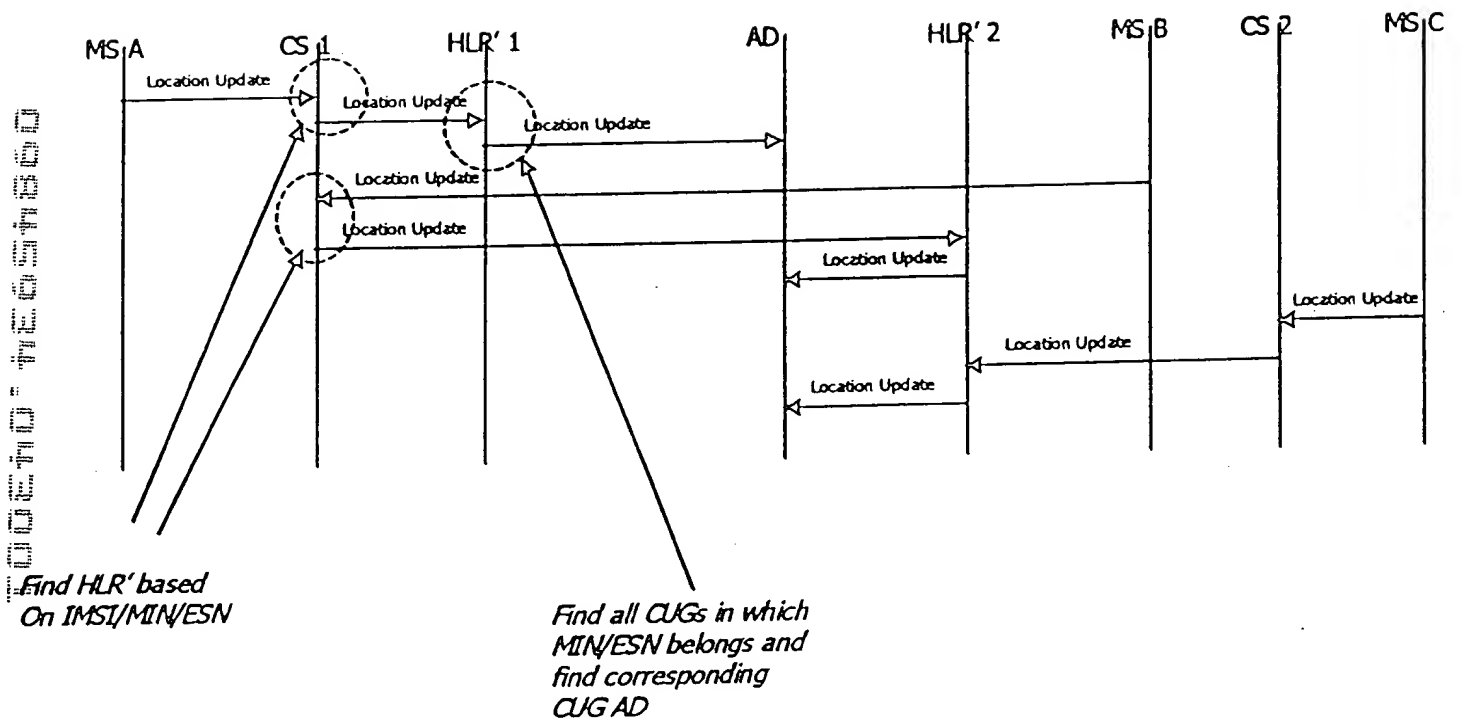


FIG. 15

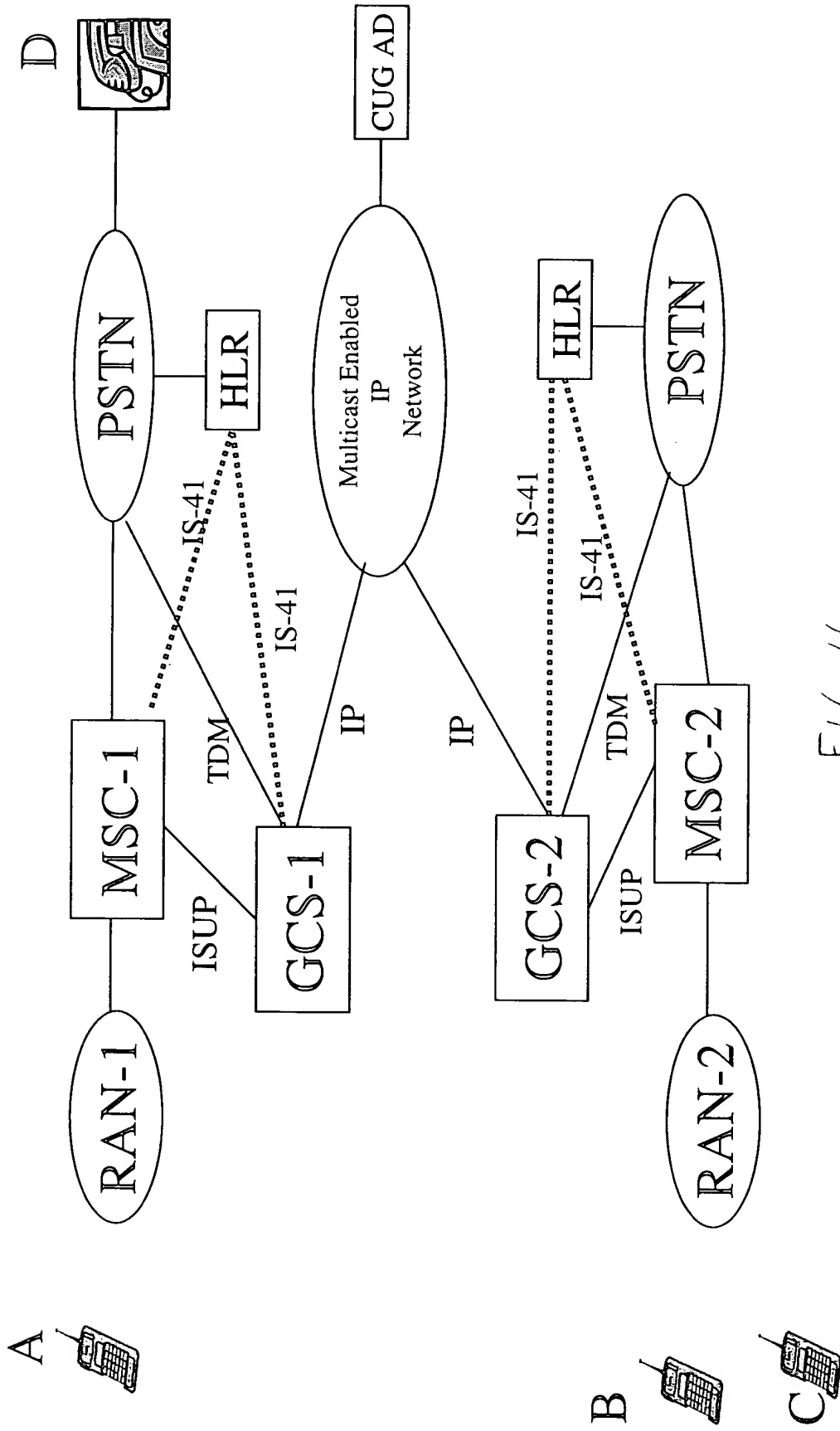


FIG. 16

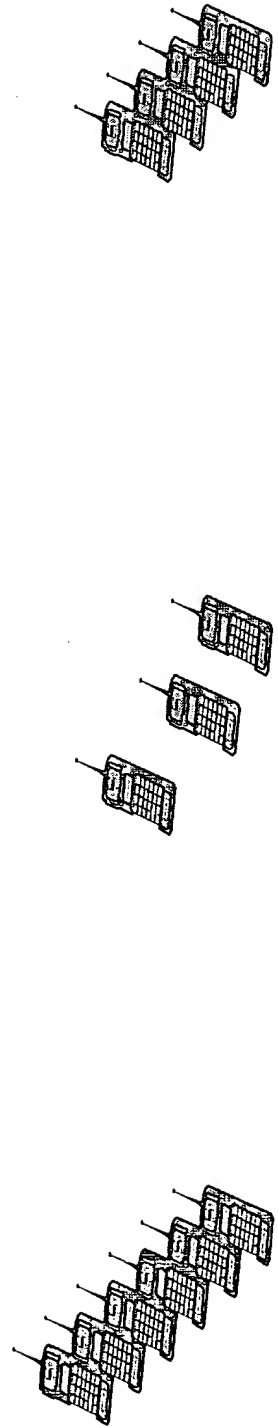
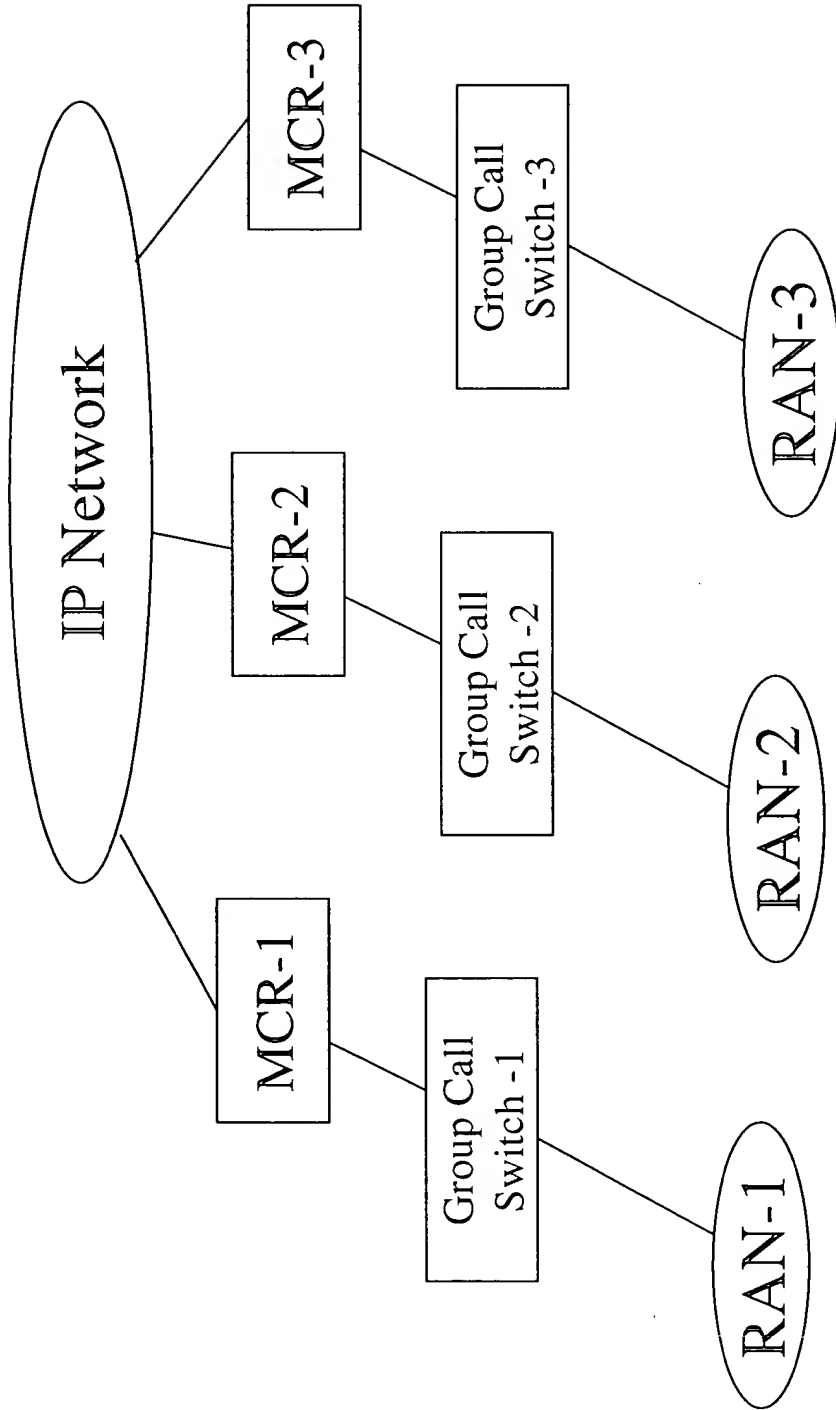


FIG. 17